We Claim:

1. A semiconductor structure comprising:

a monocrystalline silicon substrate;

an amorphous oxide material overlying the monocrystalline silicon substrate;

a monocrystalline perovskite oxide material overlying the amorphous oxide material;

a monocrystalline compound semiconductor material overlying the monocrystalline perovskite oxide material; and

an optical processing layer overlying the monocrystalline compound semiconductor material.

2. The semiconductor structure of claim 1 wherein the optical processing layer is a passive layer.

3. The semiconductor structure of claim 1 wherein the optical processing layer is selected from the group consisting of a micro-Fresnel lens, a hologram lens, a grating lens, a filter, a diffusion layer, a polarizer, a collimator, and a zone plate in combination with an objective lens.

4. The semiconductor structure of claim 1 wherein the optical processing layer is a active layer responsive to an active layer control signal.

5. The semiconductor structure of claim 1 wherein the optical processing layer is selected from the group consisting of an electro-optic element, an electronically switchable Bragg grating (ESBG), a switchable hologram, a switchable diffraction grating, a switchable collimator, an application specific optical element (ASOE), a switchable refractive element, and a liquid crystal array.

6. The semiconductor structure of claim 1 wherein the optical processing layer is a semi-active layer.

7. The semiconductor structure of claim 1 wherein the optical processing layer is a photo luminescent layer.

8. The semiconductor structure of claim 1 wherein the optical processing layer further comprises a plurality of optical processing sub-layers.

9. The semiconductor structure of claim 1 wherein the optical processing layer further comprises a feedback sensor.

10. The semiconductor structure of claim 1 wherein the monocrystalline compound semiconductor material further comprises a monocrystalline compound semiconductor material having a plurality of lasers to produce photons.

11. The semiconductor structure of claim 10 wherein optical processing layer further comprises an optical processing layer having a high beam state for collimating the photons and a low beam state for redirecting and diffusing the photons.

12. The semiconductor structure of claim 10 wherein the plurality of lasers further comprises a first laser group and a second laser group, the first laser group synchronized with the second laser group; and wherein the optical processing layer further comprises a first electro-optic element, the first electro-optic element optically connected to the first laser group.

13. The semiconductor structure of claim 12 wherein the optical processing layer further comprises a second electro-optic element, the second electro-optic element optically connected to the second laser group.

14. A process for fabricating a semiconductor structure comprising:

providing a monocrystalline silicon substrate;

depositing a monocrystalline perovskite oxide film overlying the monocrystalline silicon substrate, the film having a thickness less than a thickness of the material that would result in strain-induced defects;

forming an amorphous oxide interface layer at an interface between the monocrystalline perovskite oxide film and the monocrystalline silicon substrate;

epitaxially forming a monocrystalline compound semiconductor layer overlying the monocrystalline perovskite oxide film; and

forming an optical processing layer overlying the monocrystalline compound semiconductor layer.

15. The process of claim 15 wherein forming an optical processing layer further comprises film laminating the optical processing layer over the monocrystalline compound semiconductor layer.

16. The process of claim 15 wherein forming an optical processing layer further comprises printing the optical processing layer over the monocrystalline compound semiconductor layer.

17. The process of claim 15 wherein forming an optical processing layer further comprises spin coating the optical processing layer over the monocrystalline compound semiconductor layer